On the Heating of the Soil of high Mountains, and its Influence upon the Limit of eternal Snow and Alpine Vegetation. By Ch. Martius.

Theory indicates, and experience proves, that the atmosphere absorbs a notable proportion of the heat transmitted by the sun to the earth. M. Pouillet estimates this quantity at ·4 of the total heat transmitted by the sun to the earth at any given moment. As the calorific ray which falls upon an elevated summit traverses a less considerable thickness of the atmosphere than that which arrives at the level of the sea, it ought to heat the summit of the mountain more than that which penetrates as far as the plain; but the rarefied air surrounding the summit does not become so much heated as that of the plain: hence it should follow that the soil at the surface and for about a foot deep, upon a high mountain, should become more heated than the air, while the contrary would take place in plains little elevated above the sea. Now this is fully confirmed by experience, as I show in this notice, through observations made in August 1842 on the Faulhorn by MM. Bravais and Peltier, and in Sept. 1844 by M. Bravais and myself, compared with corresponding ones made at Brussels by M. Quetelet, and with those made in Spitzbergen in 1839 by the Meteorological commission attached to the expedition of 'La Recherche.'

This relatively considerable heating of the surface of the soil exerts a powerful influence upon the physical geography of the high Alps: it is this which moves upward the line of eternal snow, the melting of which is principally due to the heat of the subjacent ground. All travellers who have ascended these elevated regions know that in the Alps the snows melt underneath in consequence of the heat of the soil. Often, when the foot is placed on the edge of a snow-field, the weight of the body breaks a superficial crust which does not rest on the soil. Sometimes we perceive with astonishment underneath these icy vaults Soldanellas in flower (*Soldanella alpina*, L., and *S. Cludii*, Thom.), with tufts of the leaves of the Dandelion. It is likewise the melting of the snow in contact with the soil which causes the sliding of the snow-fields which form the spring avalanches of turfy declivities. Finally, it is this heating which explains the variety of species of plants, and the number of individuals which cover the soil at the very limit of the eternal snows: thus, upon the terminal cone of the Faulhorn, the height of which is about 250 feet, the superficies about 11 acres, and the altitude nearly 9000 feet, I have gathered 131 species of Flowering plants. On the Grands-Mulets (needles of laminated protogene rising in the midst of the glaciers of Mont Blanc, at 10,000 feet above the sea), I have noted nineteen Phanerogamia,—viz. *Draba vladinensis*, Wulff., *Cardamine bellidifolia*, L., *Silene acaulis*, L., *Potentilla frigida*, Vill., *Phyteuma hemisphæricum*, L., *Erigeron uniflorum*, L., *Pyrethrum alpinum*, Willd., *Saxifraga bryoides*, L., *S. grœnlandica*, Lap., *S. muscoides*, Auct., *Androsace helvetica*, Gaud., *Avena pubescens*, DC., *Gentiana verna*, L., *Luzula spicata*, DC., *Festuca Halleri*, Vill., *Poa laxa*,

Haenckе, *P. cæsia*, Sm., *Agrostis rupestris*, All., *Carex nigra*, All.; but then, on the 28th of July, 1846 (the temperature of the air in the shade being 48°·9 Fahr., in the sun 52°·5 Fahr.), the schistose gravel of the rock in which these plants vegetated indicated a temperature of 84°·2. As a contrast, I will again cite Spitzbergen. This archipelago, whose shores may equally be regarded as touching the limits of eternal snows, occupies no less than 4½° of latitude by 12° of longitude, and yet contains no more than 82 Phanerogamia.

In the Alps, the plants are heated by the soil which bears them more than by the air which surrounds them; a vivid light favours their respiratory functions; and even when the temperature descends to the freezing-point during the day, a layer of recent snow preserves them even in summer from the accidental chills which always accompany bad weather on high mountains. Equally sensitive to cold and heat, they can only bear temperatures between about 32° and 59°; constantly moistened by clouds or irrigated by the water flowing from the melting snow, they require the utmost care to make them prosper in the plains; for the gardener must defend them against the cold of winter and the heats of summer, yet without keeping them from the influence of light. At Spitzbergen, on the contrary, in spite of the perpetual day of summer, the vegetation is poor and scattered, because the rays of the sun, being for the most part absorbed by the great thickness of the atmosphere and the continual fogs, can neither heat nor illuminate this frozen country.—*Comptes Rendus*, May 16, 1859.

Note on the Artificial Propagation of Salmon.

By A. D. Bartlett.

The Committee of the Australian Association have been trying a series of experiments with a view of ascertaining the possibility of conveying Salmon to Australia, for the purpose of introducing this noble fish into the rivers of that country. The difficulty is to convey them across the tropics; and the object of these experiments, which have been carried on in the Crystal Palace under my supervision, has been—

1. To filter a sufficient quantity of water to supply a running stream for the spawn or young fish.

2. To ascertain the highest amount of temperature in which they would live.

3. To discover the best and most economical means of lowering the temperature, that they may be kept alive while passing the tropics.

In order to accomplish the first object, arrangements were made with the Charcoal Filter Company to fix filters to supply a running stream through long boxes, which were partly filled with gravel and small stones, upon which the Salmon ova were to be placed.

Mr. Ramsbottom being engaged to obtain the ova, to ensure their being perfectly impregnated, and to deposit them in the breed-